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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,605	06/23/2003	Gervase Maxwell Christie	D-21357	9584

27182 7590 10/17/2006

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EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/600,605	CHRISTIE ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Appeal Brief

This document is submitted in reply to the Appeal Brief dated 08/30/06. Prosecution of the present application is re-opened for the main purpose of presenting a 112 rejection which was not presented earlier in the prosecution and which is critical for the understanding of applicant's inventive concept. In addition to that, new grounds of rejection are set forth below. Thus, the present claims stand rejected over the previously presented grounds of rejections as well as over new grounds of rejections for the reasons of record.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Independent claim 1 recites, inter alia, "*a further part of the hydrogen to operate on a scheduled basis when not powering the load to maintain the polymer membrane in a hydrated condition...*". As best understood by the examiner, if a further part of the hydrogen is being consumed to operate the fuel cell on a scheduled basis, power is still generated due to the chemical conversion of reactant. As such, if the load is not powered, as currently claimed, then the generated power is not drawn or outputted

from the fuel cell system, and potentially, catastrophic or deleterious damages, not to say an explosion, can be caused to the system.

Since the as-filed specification does not describe what happens to power generated when consuming "*the further part of the hydrogen*" or where the power goes when "*the further part of the hydrogen*" is consumed, it is deemed that the as-filed specification fails to enable a skilled artisan how to use or make the invention at hand. A careful reading and understanding of the disclosure reveals that applicant's intent is only to store supplemental or auxiliary or storage hydrogen for supporting maintenance operation of the fuel cell system for hydration of the membrane. Nevertheless, since the fuel cell necessarily generates power during such maintenance operation as hydrogen is chemically consumed in the electrochemical reaction for generation of by-product water necessary to hydrate the membrane but applicant's load is not powered by said power, then the specification does not reasonably enable one skill in the art to use the fuel cell system during scheduled maintenance.

One possibility could have been that applicant's intent was to use any moisture whatsoever contained in the storage, auxiliary or supplemental hydrogen used for the scheduled maintenance (i.e. without chemically reacting the further part of hydrogen to avoid generation of power, that is to say, only to physically remove water moisture from the auxiliary, supplemental or storage hydrogen) but applicant's as-filed specification is also wholly silent about such possibility. Thus, one way or another, the as-filed specification fails to sufficiently describe how the fuel cell can be adequately operated or used during scheduled maintenance. On one hand, if the claimed load is not powered by the power generated during the scheduled maintenance, then what happens to the power generated during maintenance operation? On the other hand, if no

chemical reaction is intended to take place so that membrane hydration occurs by physical removal of water contained in the storage, auxiliary or supplemental hydrogen, then the specification as filed does not expressly describe how such a process is carried out so as to enable membrane hydration. There is no mention in the specification about the water content of the storage, auxiliary or supplemental hydrogen. Nor is specific description of how water removal for membrane hydration purposes is carried out.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 1 recites the limitation "*the fuel cell consuming part of the hydrogen*" in line 2. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 1 recites the limitation "*the part of the hydrogen*" in line 7. There is insufficient antecedent basis for this limitation in the claim. Since claim 1 recites both "*the fuel cell consuming part of the hydrogen*" in line 2 and "*a further part of the hydrogen*" in line 4, it is unclear what specific "*part*" applicant intends to recite in line 7.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-5 and 7-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Shabana et al 2004/0018632.

The present claims are directed to a hydrogen storage system wherein the disclosed inventive concept comprises the specific main and auxiliary hydrogen storage system.

As to claims 1 and 7:

Shabana et al disclose a hydrogen processing unit for a cell storage systems (TITLE) wherein the hydrogen processing unit is provided for attachment between a fuel cell stack (or stacks) and a hydrogen storage media (a plurality of hydrogen storage media) (ABSTRACT). The hydrogen storage includes a hydrogen pressure regulator and other ancillary equipment to enable selective attachment of hydrogen storage media in different forms including compressed gas (ABSTRACT). The fuel cell is a polymer electrolyte/proton exchange membrane fuel cell (SECTION 0014)

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

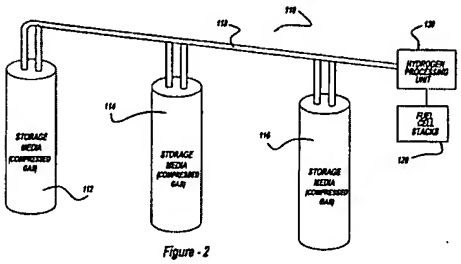

Figure - 2

Figure 1 below also illustrate the fuel cell system incorporating a hydrogen processing unit which is selectively connectable to a variety of different hydrogen storage media 40, 42, 46, 50 and 52 and to a hydrogen pressure regulator 36 (←***emphasis added***) (SECTION 0012).

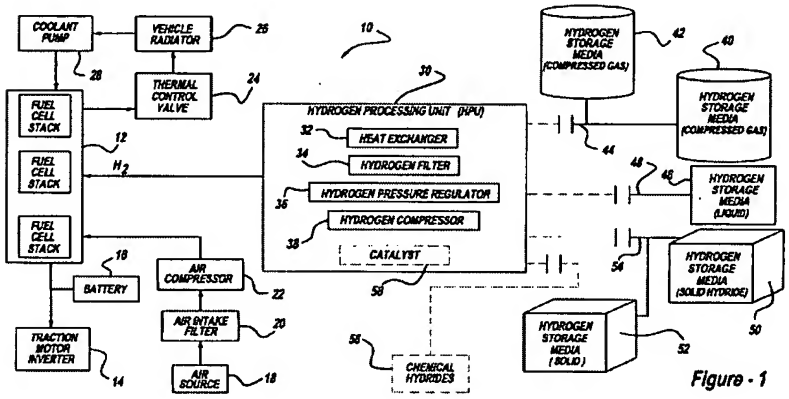

Figure - 1

1st Examiner's note: *the specific preamble reciting "for supplying hydrogen to a fuel cell employing a polymer membrane, the fuel cell consuming part of the hydrogen to power a load in accordance with a predetermined electrical power requirement and a further part of the hydrogen to operate on a scheduled basis when not powering the load to maintain the polymer membrane in a hydrated condition" refers to intended use. That is, the claim is directed to "a hydrogen storage system" per se and the aforementioned preamble phrase is only a statement of ultimate intended utility.*

With respect to claims 2 and 8:

The use of a pressure regulator/throttle valve is taught (SECTION 0006, 0018).

Concerning claim 3:

As illustrated in **Figure 2** above, the hydrogen processing unit of Shabana et al includes 3 storage media for compressed hydrogen gas (See FIGURE 2). In addition to that, as evident from **Figure 1** above, the fuel cell system 10 includes a variety of different hydrogen storage media 40, 42, 46, 50 and 52 (See Figure 1); and Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds.*

In reference to claims 4-5 and 8:

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

In addition, Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). Shabana et al disclose the hydrogen pressure regulator drops

the pressure to a predetermined a desired stack pressure when the hydrogen storage media is compressed gas (SECTION 0018), and/or liquid hydrogen (SECTION 0019), and/or hydrogen in solid form (SECTION 0020). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds. Hence, Shabana et al discloses the pressure harmonization of each hydrogen storage media (gas, liquid or solid) when they are combined together.*

As for claims 9-10:

Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Thus, periodical removal and replacement of the hydrogen storage media is contemplated.*

Thus, the claims are anticipated.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claim 1-5 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shabana et al 2004/0018632 in view of Fairlie et al 2005/0145505.

As to claims 1 and 7:

Shabana et al disclose a hydrogen processing unit for a cell storage systems (TITLE) wherein the hydrogen processing unit is provided for attachment between a fuel cell stack (or stacks) and a hydrogen storage media (a plurality of hydrogen storage media) (ABSTRACT). The hydrogen storage includes a hydrogen pressure regulator and other ancillary equipment to enable selective attachment of hydrogen storage media in different forms including compressed gas (ABSTRACT). The fuel cell is a polymer electrolyte/proton exchange membrane fuel cell (SECTION 0014)

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

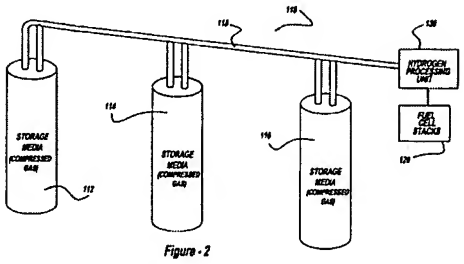

Figure - 2

Figure 1 below also illustrate the fuel cell system incorporating a hydrogen processing unit which is selectively connectable to a variety of different hydrogen storage media 40, 42, 46, 50 and 52 and to a hydrogen pressure regulator 36 (←***emphasis added***) (SECTION 0012).

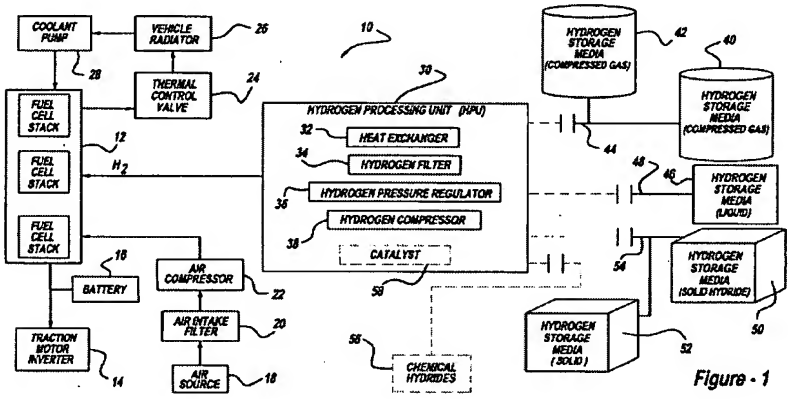

Figure - 1

1st Examiner's note: *the specific preamble reciting "for supplying hydrogen to a fuel cell employing a polymer membrane, the fuel cell consuming part of the hydrogen to power a load in accordance with a predetermined electrical power requirement and a further part of the hydrogen to operate on a scheduled basis when not powering the load to maintain the polymer membrane in a hydrated condition" refers to intended use. That is, the claim is directed to "a hydrogen storage system" per se and the aforementioned preamble phrase is only a statement of ultimate intended utility.*

With respect to claims 2 and 8:

The use of a pressure regulator/throttle valve is taught (SECTION 0006, 0018).

Concerning claim 3:

As illustrated in **Figure 2** above, the hydrogen processing unit of Shabana et al includes 3 storage media for compressed hydrogen gas (See FIGURE 2). In addition to that, as evident from **Figure 1** above, the fuel cell system 10 includes a variety of different hydrogen storage media 40, 42, 46, 50 and 52 (See Figure 1); and Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds.*

In reference to claims 4-5 and 8:

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

In addition, Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). Shabana et al disclose the hydrogen pressure regulator drops

the pressure to a predetermined a desired stack pressure when the hydrogen storage media is compressed gas (SECTION 0018), and/or liquid hydrogen (SECTION 0019), and/or hydrogen in solid form (SECTION 0020). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds. Hence, Shabana et al discloses the pressure harmonization of each hydrogen storage media (gas, liquid or solid) when they are combined together.*

As for claims 9-10:

Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Thus, periodical removal and replacement of the hydrogen storage media is contemplated.*

Shabana et al disclose a hydrogen storage system as discussed above. However, (*assuming arguendo that*) Shabana et al does not expressly disclose the flow control network to regulate hydrogen (*a point not admitted by the examiner*).

Fairlie et al disclose a hydrogen energy distribution network including a unit controller for receiving and processing hydrogen demand data receive from controllers (ABSTRACT). Fairlie et al's invention relates to the use of hydrogen as a fuel for a fuel cell wherein hydrogen is converted into electrical energy, for combustion as an auxiliary energy source and for the generation of electricity, particularly, as part of an electrical distribution system (P0001).

Specifically, Fairlie et al disclose a connected network of hydrogen fuel cells; the cells and control associated means on the network communicate electrical demand and receive from the system operator/scheduler the amount of hydrogen fuel needed to be produced and related data such as the time period for refueling (P0042). Individual operation of fuel appliances, using scheduled hydrogen production as a form of virtual storage to manage and even control the electrical system is employed (P0042).

Fairlie et al clearly disclose interconnected network to determine, control and supply hydrogen from the hydrogen production means to a particular zone (P0061) so as to meet demands of users subject to the availability of energy resources; and controller permit hydrogen to flow through conduits (P0075). Network controller determines the nature of the demand with respect to the quantity of hydrogen requested, the time to deliver the hydrogen, the conditions under which to deliver the hydrogen with respect to temperature, pressure, purity and the like, and the rate of delivery of hydrogen requested (P0083, 0108, 0110, 0113, 0114/ CLAIMS 36-39 and CLAIMS 145-148). *Thus, Fairlie et al fully envision a flow control network for distributing hydrogen for power generation purposes.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to use the flow control network to regulate hydrogen of Fairlie et al in the hydrogen storage system of Shabana et al because Fairlie et al teach that the disclosed flow control network (network controller) allows to determine the nature of the demand with respect to the quantity of hydrogen requested, the time to deliver the hydrogen, the conditions under which to deliver the hydrogen with respect to temperature, pressure, purity and the like, and the rate of delivery of hydrogen requested.

Therefore, efficient and reliable hydrogen control, regulation and distribution is achieved by employing a hydrogen network controller. *The teachings of Fairlie et al as discussed above are fairly pertinent to the invention of Shabana et al because they both address the same problem of providing suitable hydrogen flow distribution, regulation and control for hydrogen energy systems or systems employing hydrogen for power generation purposes. As such, their respective teachings are also pertinent to the field of applicant's endeavor as applicant's inventive concept fully encompasses controlled distribution of hydrogen fuel in a fuel cell system which is an electrochemical system utilizing hydrogen as a fuel for power generation.*

12. Claim 1-5 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shabana et al 2004/0018632 in view of Manning et al 6792981.

As to claims 1 and 7:

Shabana et al disclose a hydrogen processing unit for a cell storage systems (TITLE) wherein the hydrogen processing unit is provided for attachment between a fuel cell stack (or stacks) and a hydrogen storage media (a plurality of hydrogen storage media) (ABSTRACT). The hydrogen storage includes a hydrogen pressure regulator and other ancillary equipment to enable selective attachment of hydrogen storage media in different forms including compressed gas (ABSTRACT). The fuel cell is a polymer electrolyte/proton exchange membrane fuel cell (SECTION 0014)

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature,

humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

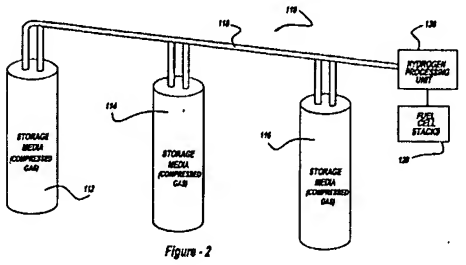

Figure - 2

Figure 1 below also illustrate the fuel cell system incorporating a hydrogen processing unit which is selectively connectable to a variety of different hydrogen storage media 40, 42, 46, 50 and 52 and to a hydrogen pressure regulator 36 (***←emphasis added***) (SECTION 0012).

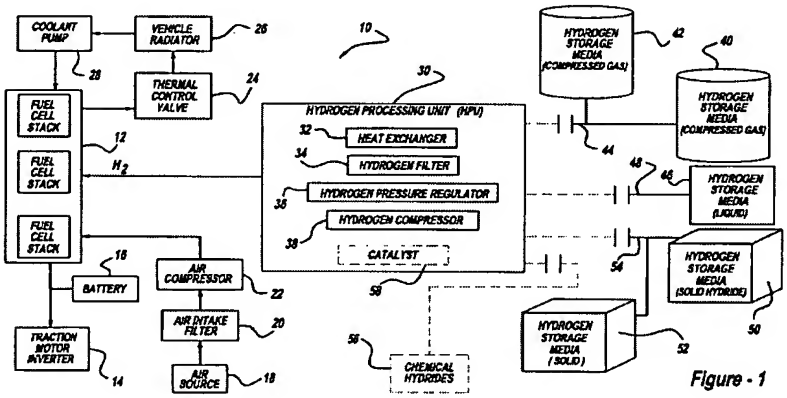

Figure - 1

1st Examiner's note: *the specific preamble reciting "for supplying hydrogen to a fuel cell employing a polymer membrane, the fuel cell consuming part of the hydrogen to power a load in accordance with a predetermined electrical power requirement and a further part of the hydrogen to operate on a scheduled basis when not powering the load to maintain the polymer membrane in a hydrated condition" refers to intended use. That is, the claim is directed to "a hydrogen storage system" per se and the aforementioned preamble phrase is only a statement of ultimate intended utility.*

With respect to claims 2 and 8:

The use of a pressure regulator/throttle valve is taught (SECTION 0006, 0018).

Concerning claim 3:

As illustrated in **Figure 2** above, the hydrogen processing unit of Shabana et al includes 3 storage media for compressed hydrogen gas (See FIGURE 2). In addition to that, as evident from **Figure 1** above, the fuel cell system 10 includes a variety of different hydrogen storage media 40, 42, 46, 50 and 52 (See Figure 1); and Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds.*

In reference to claims 4-5 and 8:

Shabana et al depict in **FIGURE 2** below a fuel cell system including three compressed gas hydrogen storage tanks 112, 114, 116 connected to a common manifold 118 for delivery to a hydrogen processing unit 130 for delivering hydrogen at the desired pressure, temperature, humidity and purity to the fuel cell stacks 120 (SECTION 0025). *Thus, Shabana et al at once envisage a flow control network to control the hydrogen flow distribution.*

In addition, Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which

includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). Shabana et al disclose the hydrogen pressure regulator drops the pressure to a predetermined a desired stack pressure when the hydrogen storage media is compressed gas (SECTION 0018), and/or liquid hydrogen (SECTION 0019), and/or hydrogen in solid form (SECTION 0020). *Therefore, Shabana et al envisions that hydrogen storage media 46, 50 and 52 can be replaced by compressed hydrogen gas tanks, accordingly, Shabana et al at once envisage the use of 5 compressed hydrogen gas tanks as the hydrogen storage media which are either connected to the common manifold or connected to uncommon manifolds. Hence, Shabana et al discloses the pressure harmonization of each hydrogen storage media (gas, liquid or solid) when they are combined together.*

As for claims 9-10:

Shabana et al disclose that the originally installed hydrogen storage media may be removed therefrom and replaced by a different type of hydrogen storage media which includes hydrogen stored in a different state such as gas without modification of the hydrogen processing unit (SECTION 0024). *Thus, periodical removal and replacement of the hydrogen storage media is contemplated.*

Shabana et al disclose a hydrogen storage system as discussed above. However, (*assuming arguendo that*) Shabana et al does not expressly disclose the flow control network to regulate hydrogen (*a point not admitted by the examiner*).

Manning et al disclose a method and apparatus for introducing a compressed gas into a pressure vessel, for instance, hydrogen into a vehicle fuel tank (ABSTRACT). Of particular interest is the Manning et al's teaching that when multiple storage tanks are used to form the

storage bank, a flow control network would be provided to successively charge the storage tanks 20 to operating pressure (COL 6, lines 45-57). Manning et al disclose using a valve 22 for controlling flow to and from storage tank 20 (COL 6, lines 45-57).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to use the flow control network of Manning et al in the hydrogen storage system of Shabana et al because Manning et al makes known that when multiple storage tanks are used to form the storage bank, a flow control network would be provided to successively charge the storage tanks 20 to operating pressure. Thus, Manning et al recognize that it is advantageous to employ a flow control network for controlling hydrogen distribution and flow rate in a storage bank containing multiple hydrogen storage tanks. *Again, the teachings of Manning et al as discussed above are fairly pertinent to the invention of Shabana et al because they both address the same problem of providing suitable hydrogen flow distribution, regulation and control of hydrogen in a hydrogen-based system.*

13. Claims 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over: a) Shabana et al 2004/0018632; and/or b) Shabana et al 2004/0018632 in view of Fairlie et al 2005/0145505; and/or c) Shabana et al 2004/0018632 in view of Manning et al 6792981 as applied to claims 1 and 7 above, and further in view of the Japanese publication JP 04-115470 (herein called "*the JP'470 publication*").

Shabana et al, Fairlie et al and Manning et al, alone or in combination, are applied, argued and incorporated herein for the reasons above. However, the preceding references do not expressly disclose the specific pressure regulators/check valve arrangement. (*This is done to*

further address applicant's specific arguments that Shabana et al does not teach what claims 2 and 8 specifically call for).

The JP'470 publication discloses a fuel cell power generator comprising hydrogen storage tanks and a common manifold 10 to distribute hydrogen therefrom (ABSTRACT). **Figure 6** below illustrates the fuel cell comprising the hydrogen distribution system including tanks 24a and 24b (*that is, two different hydrogen storage sites,* ←***emphasis added***); valves 76a, 76b and pressure regulator/indicator 25a, 25b. The JP'470 publication mentions that hydrogen is fed to the storage tank through the manifold 10, and thereafter, said hydrogen is re-introduced into the fuel cell (ABSTRACT). *Thus, hydrogen is periodically renewed so that sufficient hydrogen is available for operation of fuel cells.*

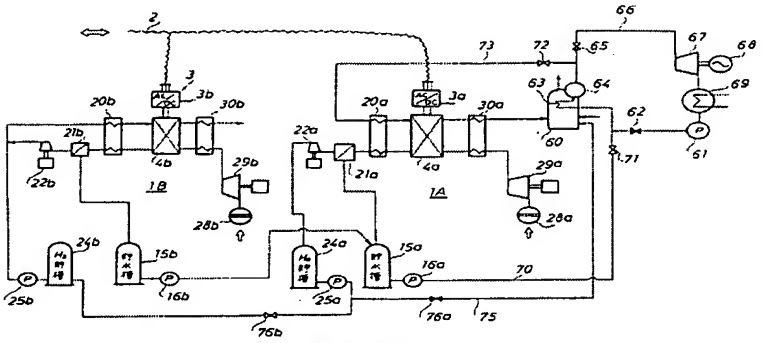

図 6

The JP'470 publication teaches that the system is effectively operated so that efficient performance thereof is achieved (ABSTRACT). *Additionally, given that the system comprises valves and pressure regulator/indicator, it can be established that it has a flow control network allowing distribution of hydrogen gas therethrough.*

Figure 6 above illustrates the fuel cell comprising the hydrogen distribution system including tanks 24a and 24b; valves 76a, 76b and pressure regulator/indicator 25a, 25b

In view of the abovementioned teachings, it would have been obvious to combine the specific pressure regulators/check valve arrangement of the JP'470 publication with the fuel cell system of Shabana et al, Fairlie et al and Manning et al because it is well-known in the art that valves and pressure regulators/indicators, when incorporated in a fluid distribution system, allow to effectively regulate, control, manage and distribute fluids. In particular, the JP'470 publication suggests to those skilled in the art that power is efficiently generated and preserved by maintaining an effective supply of hydrogen. Thus, the JP'470 publication readily envisions the benefits of having a regulated fluid distribution system including valves and pressure regulators/indicators.

14. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over: a) Shabana et al 2004/0018632; and/or and/or b) Shabana et al 2004/0018632 in view of Fairlie et al 2005/0145505; and/or c) Shabana et al 2004/0018632 in view of Manning et al 6792981; and/or c) Shabana et al 2004/0018632 further in view of the Japanese publication JP 04-115470 (herein called "*the JP'470 publication*") as applied to claim 2 above, and further in view of McAlister 6756140.

Shabana et al, Fairlie et al, Manning et al, the JP'470 publication are applied, argued and incorporated herein for the reasons above. Nevertheless, the preceding prior art reference does not expressly disclose the specific carbon-fiber wrapped hydrogen cylinder/tank.

McAlister discloses energy conversion devices (TITLE) using a fiber reinforced composite cylindrical tank with walls comprising densely wrapped carbon fiber (COL 9, line 55-65 and COL 10, line 14-18).

In view of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to use the specific carbon-fiber wrapped hydrogen cylinder/tank of McAlister in the hydrogen processing unit of Shabana et al, Fairlie et al, Manning et al, the JP'470 publication as McAlister teaches that such specific cylinder tank is capable of effectively sustaining high pressures as required for storing hydrogen as well as it is useful in mobile applications.

Response to Arguments

15. Applicant's arguments with respect to foregoing claims have been considered but are moot in view of the new ground(s) of rejection.

16. Applicant's arguments filed on 08/30/06 have been fully considered but they are still unpersuasive. However, prosecution of the present application has been re-opened to address a 112 issue raised after closing the same and during the final analysis of the present application before issuing the Examiner's Answer.

Previous responses to applicant's arguments still apply to the ground of rejection set forth above.

17. Having overcome the prior art rejection over the JP'470 publication, the main contention of applicant's arguments is reduced to the assertion that in the remaining applied reference (Shabana et al) "*Hydrogen would be drawn simultaneously from all three storage tanks and not just one of the storage tanks for maintenance purposes as recited in claim 1*".

First of all, applicant's arguments are confusing and ambivalent because at page 7, lines 17-19 of the amendment of 12/29/05 it has been stated that "*Shabana et al. discloses a hydrogen*

processing unit 30 which is configured to selectively receive hydrogen gas either a compressed gas source, a liquid hydrogen source or a solid source, but not all at once". Then, on page 8, lines 8-10 in the 12/29/05 amendment, applicant has just argued the opposite: "*Hydrogen would be drawn simultaneously from all three storage tanks and not just one of the storage tanks for maintenance purposes as recited in claim 1*". Thus, applicant's position is unclear.

Thus, assuming arguendo that applicant's position is that Shabana et al teach that "*hydrogen would be drawn simultaneously from all three storage tanks and not just one of the storage tanks for maintenance purposes as recited in claim 1*", the examiner merely points out that the present claim language neither specifically calls for nor positively sets forth that both of the main hydrogen storage site and the auxiliary hydrogen storage site cannot deliver hydrogen simultaneously. Simply put, the examiner is of the view that if hydrogen is simultaneously drawn from all three storage tanks, then, any one of the three hydrogen storage sites contains/provides the hydrogen portion (part) for power generation and any of the other two remaining hydrogen storage sites is capable of containing/providing the hydrogen portion (part) to operate in a hydrated condition. Succinctly stated, it is the examiner's position, upon reading the claim language of independent claims 1 and 7, that the function or step of powering the load and the scheduled basis to maintain hydrated conditions can take place at the same time or simultaneously because the present claim language does not positively require that powering the load occurs at a different time or moment than maintaining hydrated conditions, or vice-versa. Stated some differently, Claims 1 and 7 do not require either: a) powering the load when not hydrating the polymer membrane, or vice versa, b) hydrating the polymer membrane when not powering the load. Claims 1 and 7 only recite that "*to maintain the polymer membrane in the*

hydrated condition without utilization of the hydrogen from the main hydrogen storage site". That is, the polymer membrane can be maintained in the hydrated condition, while generating power, as long as no hydrogen from the main hydrogen storage site is utilized for the purposes.

On the other hand, if applicant is of the opinion that "*Shabana et al. discloses a hydrogen processing unit 30 which is configured to selectively receive hydrogen gas either a compressed gas source, a liquid hydrogen source or a solid source, but not all at once*". Then, the examiner contends that selectively supplying hydrogen from either one of the hydrogen gas source at different times or moments (i.e. "*but not all at once*") provides the necessary functional and structural interrelationship to satisfy the claimed requirement of independently supplying hydrogen for power generation from a first hydrogen source, and subsequently, supplying hydrogen for maintaining the hydrated condition from another hydrogen source regardless of whether or not the another hydrogen source also generates power. In other words, a first hydrogen source is construed as providing hydrogen for power generation per se while another (a second) hydrogen source is construed as supplying hydrogen for maintaining hydrated conditions per se although the another (second) hydrogen source may also be providing hydrogen for power generation.

18. In response to applicant's argument that "*the auxiliary hydrogen storage site can be renewed independently of the main hydrogen storage site*", it is first asserted that applicant has admitted that the cited references does teach three separate-independent-stand alone hydrogen tanks. Therefore, the examiner avers that as long as these three hydrogen storage tanks are separate-independent-stand alone tanks, any of the tanks can be renewed independently from the other. There is no evidence of record, either in the cited reference or by submission of an

applicant's declaration, to show that these hydrogen tanks cannot be replaced and/or if they are removed the fluid connecting line would be catastrophically damaged or broken. Indeed, paragraph 0024 of Shabana et al offer specific guidance to support hydrogen source renewal as it states that "*the originally installed hydrogen storage media may be removed from the vehicle and replaced by a different type of hydrogen storage media*". Thus, Shabana et al readily envisions independent replacement of hydrogen storage sources.

19. In response to applicant's arguments, the recitation "*to operate on a scheduled basis when not powering the load*" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

20. Lastly, applicant's arguments concerning the limitation "*a flow control network*" has been fully considered. However, such a limitation adds nothing to the patentability of the present claims simply because it lacks specific structural characteristics or features to fairly distinguish over the "*fluid distribution line (network)*" of the prior art. A flow control network is being broadly interpreted as a simple distribution line for feeding/distribution or delivering flow. Nothing more, nothing less. If applicant wants to afford it a different interpretation, such as including additional components, members and/or structures, applicant must do so by amending the claims to recite such components, members and/or structures. Otherwise, arguing the

presence of un-recited limitations or components just renders applicant's argument not commensurate in scope with the present claim language.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Primary Examiner
Art Unit 1745

RAYMOND ALEJANDRO
PRIMARY EXAMINER